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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---------------------------|-------------|----------------------|---------------------|------------------|
| 10/620,346 | 07/17/2003 | Hiroshi Sumi | Q76616 | 8680 |
| 65565 | 7590 | 11/10/2008 | | |
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| EXAMINER | | | | |
| LAM, CATHY FONG FONG | | | | |
| ART UNIT | | PAPER NUMBER | | |
| 1794 | | | | |
| MAIL DATE | | DELIVERY MODE | | |
| 11/10/2008 | | PAPER | | |

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/620,346

Applicant(s)

SUMI ET AL.

Examiner

Cathy Lam

Art Unit

1794

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 September 2008.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 2, 4-10 and 15-20 is/are pending in the application.
4a) Of the above claim(s) 15 is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1, 2, 4-10 and 16-20 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 10-28-2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____

DETAILED ACTION

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on September 02, 2008 has been entered.

Election/Restrictions

2. This application contains claim 15 is drawn to an invention nonelected with traverse. A complete reply to the final rejection must include cancellation of nonelected claims or other appropriate action (37 CFR 1.144) See MPEP § 821.01.

Claim Rejections - 35 USC § 112

3. Claims 8-9 and 19-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 8-9 and 19-20, it is vague and indefinite as to what is "inorganic material" referring to? Clarification is required.

Claim Rejections - 35 USC § 103

4. Claims 1, 2, 4-10 and 16-20 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Kang et al (US 5296189).

Kang discloses a conductive composition comprised of copper particles and alumina particles. The conductive composition is formed into a conductive paste which is screen-printed onto a ceramic substrate to form a printed circuit board. The conductive paste may be filled into via holes of the ceramic substrate or printed onto the surface of the ceramic substrate (col 6 L 40-43 & L 54-56).

The conductive composition that comprised of copper particles having initial particles size of 2 to 5 μm and the alumina particles of 0.05 to 0.1 μm (or 50-100 nm) in average (col 5 L 43-45 & L 68-col 6 L 1). Kang further teaches that other inorganic materials such as titania (or TiO_2) and silica (or SiO_2) are feasible and have the same function as alumina (Al_2O_3) particles (col 4 L 34-35). The amount of alumina particles is 0.5 to 2 wt% (col 4 L 40-41).

The conductive composition further comprised of an organic vehicle and/or binder (col 9 L 39-40).

The prior art is silent about the resistivity of the conductive layer (as in claim 4), the examiner is taking the position that since Kang's conductive paste meets the claimed composition, Kang's copper paste inherently possesses the same resistivity.

The examiner is taking the position that Kang teaches claims 6, 8-9, 16-20 since average size of the alumina particles is 0.05 μm (or 50 nm), i.e. < 2 μm . Kang further teaches that such small size alumina particles is for a more homogeneous mixture with the copper power and to reduce inter-particle porosities (col 6 L 1-12). This implies that the inorganic particles are evenly dispersed with the copper particles and formed a homogeneous conductive layer (col 4 L 57-61).

Regarding to claim 7, Kang teaches a multilayer printed circuit board, and the conductive paste that is formed in the via holes and between the ceramic substrates, the examiner is taking the position that the conductive paste is subjected to a plating treatment (col 6 L 51-56).

Kang teaches the present invention but does not specifically teach having both SiO_2 and ceramic particles, however in view of column 4 lines 30-35, it clearly shows that TiO_2 and SiO_2 have the same function as Al_2O_3 , thus choosing two of more of these sintering retardant materials is conventional in the art.

Regarding to the limitation of the SiO_2 being 40 nm or less and claims 16-18, the specification clearly states that the workable SiO_2 size can be 50 nm or less, there would be no detrimental effect as long as the particle size is no greater than 50 nm (page 7 L 18-22). However in claims 8-9 & 19-20, Applicant's invention may include inorganic particles having sizes that are 2 μm or 3 μm (i.e. 2000 nm or 3000 nm). The examiner finds the claims contradicting, since Applicant in the independent claims limit the inorganic particles to 40 nm or less for SiO_2 and 100 nm or less for ceramic particles, but the dependent claims allow some larger size inorganic particles. Since the depending claims allow some inclusion of larger particles, the examiner is taking the position that having a slight larger SiO_2 or Al_2O_3 , that is 50-100 nm, would have no detrimental effect.

Regarding to claim 5, Kang discloses the ceramic substrate that is formed of crystallizable glass particles that are densified to from a green sheet (col 7 L 8-13).

The crystallizable glass particles can include lithium disilicate and/or eucryptite, both of which containing lithium and in the form of an alkali metal oxide (col 9 L 3-20).

Kang is silent about the mol% of the alkali metal oxide in the green sheet. In view of Kang's teaching, one skill in the art would choose a workable amount because it only involves routine experimentation.

Response to Arguments

5. Applicant's arguments filed September 02, 2008 have been fully considered but they are not persuasive. Applicant's Declaration under 37 CFR 1.132 is acknowledged and fully considered. Applicant picked some examples to demonstrate the present invention.

6. Example 2A, the conductive paste includes 1wt% of Al_2O_3 and Additional Example uses a 80nm SiO_2 particles for the conductive paste. Both examples have not shown the true differences between the Kang et al (US 5296189) and the present invention.

7. Kang teaches a conductive paste comprised of copper powder and an alumina powder. The alumina powder can be replaced or combined with other ceramic oxides such as silica (or SiO_2), yttria, thoria and titania (i.e TiO_2), etc. The inorganic oxide powder has a size of from about 0.05 to 0.1 μm (50-100nm), and in the amount of 0.5 to 2.0 wt% (col 4 L 32-41). Kang meets the material and the amount of the claimed glass and ceramic particles. The prior art does not teach the particle sizes for the glass and ceramic particles. This shortage is obvious and has been fully explained in the art rejection above.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cathy Lam whose telephone number is (571) 272-1538. The examiner can normally be reached on 9am-6pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rena Dye can be reached on (571) 272-3186. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Cathy Lam/
Primary Examiner, Art Unit 1794